

CHAPTER 1: HAZARDOUS MATERIALS SAFETY

A. INTRODUCTION

The Coast Guard's concerns for hazardous materials safety include those solids, liquids, and gases (liquefied or under pressure) that are dangerous to human life and property. For purposes of hazard classification, hazardous materials are divided into three main areas: "bulk" liquids and liquefied gases, "packaged cargoes," and "bulk solids." The phrase "carried in bulk" refers to a commodity that is loaded or carried aboard a vessel without containers or labels, and received and handled without mark or count.

SECTION F: CARRIAGE OF HAZARDOUS MATERIALS

CHAPTER 1: HAZARDOUS MATERIALS SAFETY

B. DEFINITIONS

- 1. Packaged Cargoes and Bulk Solids**

The definition of hazardous materials depends on whether packaged or bulk cargoes are involved. The Hazardous Materials Transportation Act (HMTA) of 1974 (49 U.S.C. 1801-1812) defines a "hazardous material" as "a substance or material that has been determined by the Secretary of the Department of Transportation (SEC DOT) to be capable of posing an unreasonable risk to health, safety, and property when transported in commerce, and which has been so designated" (see 49 CFR 171.8). This is a very broad definition, in that it includes many commodities that may not be allowed for shipment in bulk.
 - 2. Bulk Materials**

For the purpose of "bulk" transportation, 46 U.S.C. 2101(14) defines a "hazardous material" as any liquid material or substance that is:

 - a. Flammable or combustible;
 - b. Designated a hazardous substance under Section 311(b) of the Federal Water Pollution Control Act (FWPCA), as amended (33 U.S.C. 1321); or
 - c. Designated a hazardous material under Section 104 of the HMTA (49 U.S.C. 803). (See 46 CFR 153.40 for a listing of materials the Coast Guard has found to be hazardous when transported in bulk under this authority.)
-

SECTION F: CARRIAGE OF HAZARDOUS MATERIALS

CHAPTER 1: HAZARDOUS MATERIALS SAFETY

C. CONTROL OF PRODUCT SHIPMENT

1. **Bulk Hazardous Liquids, Liquefied Gases, and Solids**
The regulations for shipments of bulk and packaged hazardous substances differ in the manner in which a product may be offered for shipment.

Under the bulk rules, a material may not be shipped in bulk without evaluation by the Hazardous Materials Standards Division, Commandant (G-MSO-3). This staff determines whether the material may be shipped in bulk and, if so, the conditions of shipment. The fact that a bulk hazardous material is not listed as regulated does not mean that it is unregulated; indeed, the material may be prohibited from bulk shipment.
2. **Products Shipped as Packaged Cargoes**
These are evaluated by the shipper, who selects the proper shipping name from 49 CFR 172.101 or 49 CFR 172.102. The package rules state that, unless the regulations prohibit shipment, a material may be shipped under one of the "not otherwise specified" (N.O.S.) categories.
3. **Evaluation of New Bulk Liquid Cargoes**
Commandant (G-MSO-3) evaluates new liquid cargoes proposed for bulk shipment under the "Criteria for Hazard Evaluation of Bulk Chemicals." These are contained in the International Maritime Organization (IMO) Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk, Resolution A.212 (latest edition). The criteria include flammability, toxicity, reactivity, and corrosivity. Cargoes whose sole hazard is flammability are regulated under 46 CFR, Subchapter D. Cargoes having hazards in addition to or other than flammability are regulated under 46 CFR 150-154.
4. **Department of Transportation (DOT) Review**
Evaluations of solids carried in bulk (i.e., in cargo holds rather than in some type of container), ships' stores, cargoes under fumigation, bulk liquids, and liquefied gases are under the purview of Commandant (G-MSO-3). The regulations in Title 46, Code of Federal Regulations (CFR) concerning bulk liquids, liquefied gases, and bulk solids are maintained by the Hazardous Materials Standards Division, Commandant (G-MSO-3). The DOT Office of Hazardous Materials Transportation (OHMT) oversees the evaluation of packaged materials and their regulation under Title 49, CFR.

NOTE: Military explosives are regulated under Title 46, CFR 146.

SECTION F: CARRIAGE OF HAZARDOUS MATERIALS

CHAPTER 1: HAZARDOUS MATERIALS SAFETY

**5. Commun-
ications with
Commandant
(G-MSO)**

As new products are added almost daily, any published list of authorized cargoes will be outdated quickly. When in doubt about a particular material, Commandant (G-MSO-3) should be contacted. If the cargo is a liquid or liquefied gas to be shipped in bulk or a bulk solid under Title 46, CFR, the division should be called at (202) 267-0103. If the material is to be shipped as a packaged cargo under Title 49, CFR, Commandant (G-MSO-3) should be called at 202/8-F17-1577. Division personnel may be reached from 0700-1530 Eastern time, Monday-Friday. Should a question arise during nonworking hours, a representative of the branch can be contacted through Headquarters Flag Plot at (202) 267-2100.

6. IMO Review

A similar division of responsibility exists within the IMO:

- a. The IMO Subcommittee on Bulk Chemicals (BCH) is responsible for the IMO Bulk Chemical Code and Gas Codes;
- b. The Subcommittee on the Carriage of Dangerous Goods (CDG) is responsible for packaged cargoes and for the IMO International Maritime Dangerous Goods (IMDG) Code;
- c. The Subcommittee on Containers and Cargoes (BC) deals with bulk solids.

NOTE: See Figure F1-1 for a summary of references concerning hazardous materials safety.

SECTION F: CARRIAGE OF HAZARDOUS MATERIALS

CHAPTER 1: HAZARDOUS MATERIALS SAFETY

D. STATUTORY AUTHORITY

The SECDOT regulates the transportation of hazardous materials under two basic statutes: the HMTA, 49 U.S.C. App. 1801-1812, and Title II of Title 46, U.S. Code. These statutes apply to foreign and U.S. vessels in U.S. waters. Under the authority delegated by the SECDOT, the Coast Guard administers and enforces the laws and regulations for the safe maritime transportation of hazardous materials. Under the HMTA, the Director of the OHMT is authorized to issue regulations for package shipments of hazardous materials. The Coast Guard advises the OHMT in the formulation of these regulations and enforces them, but may not permit exemptions from them. The Ports and Waterways Safety Act (PWSA), as amended, makes the Coast Guard responsible for the safety of waterfront facilities that handle hazardous materials.

➔ See MSM II, Sec. B, Ch. 8 for a general discussion of facility inspections.

Controlling Authority:	G-MOC	Releasing Authority:	G-M	Revision Date:	21 May 00	Page	F1 - 5
------------------------	-------	----------------------	-----	----------------	-----------	------	---------------

USCG Marine Safety Manual, Vol. II: Materiel Inspection

SECTION F: CARRIAGE OF HAZARDOUS MATERIALS

CHAPTER F1: HAZARDOUS MATERIALS SAFETY

FIGURE F1-1: SUMMARY OF INFORMATION CONCERNING THE HAZARDOUS MATERIALS SAFETY PROGRAM

	Bulk Liquids and Liquefied Gases	Packaged Cargoes, Including Portable Tanks	Bulk Solids	Fumigation	Ship' Stores
COGNIZANT SECTION G-MSO	Bulk Cargo	Packaged Cargo	Bulk Cargo	Bulk Cargo	Bulk Cargo
AGENCY WITH AUTHORITY	Coast Guard	Office of Hazardous Materials Transportation (OHMT)	Coast Guard	Coast Guard	Coast Guard
APPLICABLE LAWS	33 U.S.C. 1221 46 U.S.C. Ch. 37	49 U.S.C. 1801	33 U.S.C. 1221 49 U.S.C. 1801	49 U.S.C. 1801	46 U.S.C. 3306 46 U.S.C. 4105 46 U.S.C. 4302
APPLICABLE REGULATIONS	33 CFR Subch. O 46 CFR Subchapters D & O	46 CFR 64,98, and 146 49 CFR 171-179	46 CFR 148	46 CFR 147a	46 CFR 147 and 194
CORRESPONDING INTERNATIONAL CODE OR CONVENTION	IMO Bulk Chemical Code (Res. A.212) Gas Carrier Code (Res. A.328) and Gas Carrier Code for Existing Ships	IMO International Maritime Dangerous Goods Code and U.N. Transport of Dangerous Goods	IMO Code of Safe Practice for Solid Bulk Cargoes	Maritime Safety Committee Circular 298 (MSC Circ. 298)	
MARINE SAFETY MANUAL	Chs 20, F1, 27, & 28	Chs F1 & 29	Chapter F1	Chapter F1	Chapter F1

USCG Marine Safety Manual, Vol. II: Materiel Inspection
SECTION F: CARRIAGE OF HAZARDOUS MATERIALS
CHAPTER 1: HAZARDOUS MATERIALS SAFETY

E. REGULATIONS

1. General

The primary regulations governing the transportation of hazardous materials by vessels are:

CFR Section	Subject
46 CFR 146	Vessels transporting military explosives
46 CFR 147	Vessels carrying ships' stores which are hazardous materials
46 CFR 148	Vessels carrying bulk solid hazardous materials
46 CFR 150	Compatible stowage of bulk liquid hazardous materials and for vessels engaged in bulk hazardous waste incineration at sea
46 CFR 151	Unmanned barges carrying hazardous materials in bulk
46 CFR 153	Self-propelled ships carrying hazardous materials in bulk
46 CFR 154	Self-propelled ships carrying liquefied gases in bulk
49 CFR 171-179	Packaged goods

2. Required Documentation

Under 46 CFR 153-154, the Coast Guard recognizes a Certificate of Fitness (COF) issued in accordance with the IMO Bulk Chemical Code, the International Bulk Chemical Code, the IMO Gas Code for New Ships, and the International Gas Carrier Code together with the International Convention for the Safety of Life at Sea (SOLAS) certificates, as equivalent to a Coast Guard issued Certificate of Inspection (COI), with some exceptions. Issuance of these documents permits issuance of a Letter of Compliance (LOC) with Subchapter O endorsement to foreign vessels without the need for Coast Guard plan review.

A similar situation exists where packaged cargo is concerned. To the extent permitted by 49 CFR 176.11, a packaged cargo shipped on a vessel in accordance with the recommendations of the IMO IMDG Code is acceptable.

NOTE: This does not mean that such vessels will meet all requirements of 46 CFR 153-154.

SECTION F: CARRIAGE OF HAZARDOUS MATERIALS

CHAPTER 1: HAZARDOUS MATERIALS SAFETY

F. INTERNATIONAL CODES

1. Introduction The codes relative to the carriage of hazardous materials are:

- "IMO Chemical Code"
- a. The Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals In Bulk, the "IMO Chemical Code," IMO Assembly Resolution A.212(VII), adopted 12 October 1971 and the "IMO International Bulk Chemical Code," IMO Resolution MSC 4(48), adopted 17 June 1983. Applies to all ships with a keel laying date before 1 July 1986. The International Bulk Chemical Code applies to all ships with a keel laying date on or after 1 July 1986. Both the IMO Bulk Chemical Code and International Bulk Chemical Code were revised and reissued to cover requirements stemming from Annex II of the International Convention for the Prevention of Pollution From Ships, 1973, as Modified by the Protocol of 1978 (MARPOL 73/78). Annex II entered into force on 6 April 1987. The revised IMO Bulk Chemical Code was adopted under Resolutions MEPC 20(22) and MSC 9(53). The revised International Bulk Chemical Code was adopted under Resolution MEPC 19(22).
- "IMO Gas Code"
- b. The Code For The Construction And Equipment Of Ships Carrying Liquefied Gases In Bulk, the "IMO Gas Code," IMO Assembly Resolution A.328(IX), adopted 12 November 1975 and the "IMO International Gas Carrier Code," IMO Resolution MSC 5(48), adopted 17 June 1983. Applies to new ships as defined in the Code with a keel laying date before 1 July 1986. The International Gas Carrier Code applies to all ships with a keel laying date on or after 1 July 1986.
- "IMO Gas Code For Existing Ships"
- c. The Code for Existing Ships Carrying Liquefied Gases In Bulk, the "IMO Gas Code For Existing Ships," applies to those gas ships not covered by the Gas Code for New Ships.
- IMDG Code
- d. The International Maritime Dangerous Goods (IMDG) Code Addresses transportation of packaged hazardous materials.
- List Of Bulk Materials Possessing Chemical Hazards
- e. Appendix B of the Code of Safe Practice for Solid Bulk Cargoes, entitled "List Of Bulk Materials Possessing Chemical Hazards," addresses transportation of bulk hazardous solids. Some of these codes are international recommendations and are not binding under international law. However, several codes dealing with hazardous materials have been incorporated into international law. These include the International Bulk Chemical Code and the International Gas Carrier Code which are both made mandatory by reference in the 1983 amendments to SOLAS 74. With the implementation of Annex II of MARPOL 73/78 on 6 April 1987, the IMO Bulk Chemical Code as well as the International Bulk Chemical Code are mandatory under international law.

SECTION F: CARRIAGE OF HAZARDOUS MATERIALS

CHAPTER 1: HAZARDOUS MATERIALS SAFETY

2. Application of Codes

Differences
Between Codes
and U.S.
Regulations

Foreign vessels built to the standards of the IMO Chemical Code do not necessarily meet Coast Guard standards. It has been the Commandant's policy to adopt these codes as minimum standards, and to establish higher standards only where essential safety concerns are involved. Because these codes are drafted by an international body, they may be vaguely worded to satisfy all member countries. In contrast, Coast Guard regulations must be as precisely worded and detailed as possible.

Sample Evaluation

The Chemical Code requires that filling pipes extend to "near the bottom of the tank." Corresponding U.S. regulations require that they must extend to within 4 inches or the fill pipe radius of the bottom of the tank. The intent is to provide specific guidance to ship designers on acceptable distances "near the bottom." In this case, for a foreign vessel whose filling pipe terminates "near the bottom of the tank," its IMO COF would be accepted, although its condition does not strictly meet Coast Guard standards.

Sources for Copies of Codes.

- | | |
|---|---|
| (1) IMO Secretariat, Publications Section
4 Albert Embankment
London SE1 75R
United Kingdom
TELEX 23588 | (2) New York Nautical Instrument and Service Co.
140 West Broadway
New York, NY 10013 |
| (3) Baker, Lyman & Company
308 Magazine Street
New Orleans, LA 70130 | (4) Labelmaster
5724 N. Pulaski Road
Chicago, IL 60646 |
| (5) UNZ & Company
170 Broadway
New York, NY 10038 | (6) Southwest Instrument Co.
235 West 7th Street
San Pedro, CA 90731 |

SECTION F: CARRIAGE OF HAZARDOUS MATERIALS

CHAPTER 1: HAZARDOUS MATERIALS SAFETY

G. IMO CHEMICAL CODE

-
- 1. Introduction** This Code, effective on 12 April 1972, is used for tankships carrying liquid chemicals in bulk. It was somewhat unusual when adopted because it required extensive upgrading of "existing" vessels, to be phased in over a 6-year period. [NOTE: IMO has defined an existing ship as one whose keel was laid before 12 April 1972.] With the exception of damage stability and midship deckhouse arrangements, an existing vessel was required to meet the same standards as a new vessel as of 12 April 1978. The Coast Guard's implementing regulations are located in 46 CFR 153. Due to delays in publication, a contradiction exists between the regulations, which define an "existing" vessel as one for which a contract was let on or before 27 December 1977, and the IMO Code. Thus, a vessel contracted for on or after 12 April 1972, but not later than 27 December 1977, may obtain a COI as an existing vessel under 46 CFR 153, but must be treated as a new vessel in order to receive an IMO COF.
-
- 2. Subdivision and Stability** Damage stability standards and protective location of cargo tanks for existing tankships are addressed in subsection 1.7.3(a)-(f) of the IMO Chemical Code and in 46 CFR 153.7(c), as follows:
- a. An existing Type III vessel (a single-hulled vessel carrying cargoes requiring Type III containment) is exempt from the Code's damage stability requirements.
 - b. An existing single-hulled vessel that must have double-bottoms and side tanks installed to continue carrying Type II cargoes should be evaluated to ensure that its damage stability is not impaired by such modifications.
 - c. An existing double-hulled vessel carrying Type II cargoes is exempt from damage stability evaluation and has less stringent requirements for bottom and side tank location clearances, but must have a double-bottom height of at least 760mm.
 - d. An existing Type III vessel that is being modified to carry Type II cargoes is required to meet the damage stability requirements of section 2.2.4 of the Code, but is not required to survive damage to the main machinery space.
 - e. Existing Type I vessels are required to meet the damage stability requirements for new ships, but may be allowed minor relaxations of side and bottom tank separation distances. In effect, these standards exempt existing vessels from damage stability evaluations, unless cargo tank configurations are modified.
-

SECTION F: CARRIAGE OF HAZARDOUS MATERIALS

CHAPTER 1: HAZARDOUS MATERIALS SAFETY

3. Design**Specifications**

As previously noted, the Commandant has waived a plan review for chemical tankers that have valid COF's. However, this does not mean that foreign vessels have the option of obtaining a COF or undergoing plan review. A foreign chemical tanker must have a valid COF to obtain an LOC unless its home administration does not issue IMO certificates. Except for unusual cases, chemical tankers holding LOC's have been designed and equipped in accordance with the IMO Code. Therefore, they should comply with the Code's operating requirements as well as 46 CFR 153. The IMO Code will be the primary reference for examination of foreign chemical tankers.

**4. Hull Type
Designations**

The format and content of the IMO Chemical Code were based to some extent on the U.S. regulations for unmanned barges carrying bulk cargoes (46 CFR 151). The designation of hull types, the table summarizing the minimum requirements, and the referencing of special requirements for individual cargoes will be familiar to users of the unmanned barge regulations. Like 46 CFR 151, the Code identifies three hull types: Type I (most hazardous cargoes), Type II (less hazardous cargoes), and Type III (least hazardous cargoes). It is stressed that there is no direct correlation between ship and barge hull types: a cargo required to be carried in a Type I barge need not necessarily be carried in a Type I ship. The ship hull type designation provides the following information about a vessel:

- a. Extent of Hypothetical Damage a Vessel can Sustain and Remain Afloat in a State of Positive Equilibrium. This is a standard used by naval architects to calculate a vessel's survivability. An important factor in plan review, it is of little concern to the inspector.
- b. Cargo Tank Location within the Hull. For example, a Type II cargo must be carried in a tank located at a distance greater than the vessel's beam divided by 15 [B/15], but not more than 6 meters above the baseline. In no case may the tank be closer than 760mm to the vessel's side or bottom shell.
- c. Maximum Quantity of Cargo that Can Be Loaded in a Tank. Type I cargoes are limited to 1250 cubic meters per tank; Type II cargoes to 3000 cubic meters per tank; Type III cargoes are not restricted.

NOTE: These are loading restrictions, not restrictions on tank sizes.

Controlling Authority:	G-MOC	Releasing Authority:	G-M	Revision Date:	Unsigned Draft	Page	F1 - 11
------------------------	-------	----------------------	-----	----------------	----------------	------	----------------

SECTION F: CARRIAGE OF HAZARDOUS MATERIALS

CHAPTER 1: HAZARDOUS MATERIALS SAFETY

5. Table of Minimum Requirements

This table, contained in Chapter 6 of the Code, summarizes minimum and special requirements for the products listed. For quick reference, products are listed alphabetically by their generic name. An explanation of the abbreviations used in the table is also provided. There are several terms, however, that require clarification:

- a. Tank Vents. Tank venting is described as either "controlled" by a pressure-vacuum valve or safety relief valve or "open" through a gooseneck vent.
- b. Tank Environmental Control. This is not clear, as the word "yes" sometimes appears with no explanation of what is required. 46 CFR 153 should be consulted to determine appropriate requirements.
- c. Electrical Instruments. Special requirements, identified by "SP," are not contained in the Code.
- d. Vapor Detection. These are specified by "no detection," "flammable vapor detection," "toxic vapor detection," or the latter two. Detectors need not be permanently installed types, but may be reagent-tube-and-aspirator types.

NOTE: For some toxic substances, toxic vapor detection equipment is not currently available. The "universal interpretation" of Section 3.11 of the Code permits the substitution of additional air supplies, which are specified in paragraph 3.16-6(b) of the Code, when toxic vapor detection equipment is not commercially available. The COF should indicate when this substitution has been allowed.

- e. Fire Protection Requirements. The type of extinguishing medium that is most effective against fires involving particular cargoes (e.g., alcohol-resistant (polar solvent) foam, non-polar solvent foam, water spray, dry chemical, or nonspecific) is identified. The Chemical Code provides standards for fixed deck foam systems aboard vessels contracted after 20 May 1980. These standards include foam monitor configuration, rates of foam production, and foam coverage. Administrations may accept other configurations and foam production rates for vessels that carry a restricted number of cargoes. For vessels built prior to 20 May 1980, individual administrations must approve installations based on their own guidelines.
- f. Special Requirements. The last column of the table references special requirements for individual products.

SECTION F: CARRIAGE OF HAZARDOUS MATERIALS

CHAPTER 1: HAZARDOUS MATERIALS SAFETY

- 6. Summary** The IMO Chemical Code leaves many areas subject to interpretation. The Commandant has therefore included greater detail in the requirements of 46 CFR 153. Other administrations may have regulations detailing different requirements that aim at the same goal. It is necessary to apply both the Code and the regulations when inspecting a foreign chemical tanker. The Code should be cited as the primary reference, with the regulations providing U.S. interpretation of the Code's requirements. The regulations should not be used for a strict letter-for-letter inspection of a foreign vessel. Navigation and Vessel Inspection Circular (NVIC) 13-82 provides a convenient cross-reference between the Code and 46 CFR 153.
-

SECTION F: CARRIAGE OF HAZARDOUS MATERIALS

CHAPTER 1: HAZARDOUS MATERIALS SAFETY

H. IMO GAS CODE FOR NEW SHIPS ("IMO GAS CODE")

1. Introduction

After adoption of the Bulk Chemical Code, IMO began development of a code for liquefied gas ships. At the outset, it was agreed that the code would apply only to new ships, to avoid problems of upgrading existing ships. Because of difficulties that became apparent with the vagueness of the Chemical Code, because the U.S. contributed more detailed requirements for gas ships, and because the requirements did not have to be "loose" to accommodate existing vessels, the Gas Code is much more detailed than the Chemical Code. Indeed, greater specificity was a primary goal of the U.S. in developing the Gas Code; however, some degree of vagueness remains. The requirements of 46 CFR 154 are intended to minimize the effects of this vagueness.

2. Comparison with the Chemical Code

The IMO Gas Code follows the philosophy of the Chemical Code and 46 CFR 153, with some differences. There are four ship types rather than three; one of these is a special category of Type II ship, called a Type IIPG.

NOTE: Ships classed under the Gas Code carry the suffix "G" to distinguish them from chemical tankers.

The damage stability requirements are similar to those for chemical tankers, except that a greater final angle of heel after damage is allowed for gas ships. Type IIPG ships have more relaxed damage stability standards than Type IIG ships. The tank location requirements for Type IG and Type IIG/IIPG vessels are the same as for Type I and II chemical tankers. Type IIIG gas ships are required to have tanks at least 760mm inboard of the hull, while no separation requirement exists for Type III chemical tankers. Also, there is no cargo limitation requirement for Type IG and IIG/IIPG cargoes, as exists for chemical cargoes. Generally, comparison of the Gas and Chemical Codes reveals the Gas Code's much more detailed requirements for tank and piping design, materials, venting, electrical equipment, fire protection, and instrumentation.

3. Minimum Requirements

General

Chapter XIX of the IMO Gas Code contains a Table of Minimum Requirements and references to special requirements for individual cargoes. The ship type is specified for each cargo, with most requiring Type IIG/IIPG ships (in practice, there are no Type IIIG and few, if any, Type IG ships in use). Type IIPG ships, which are small vessels having pressure vessel tanks rated for at least 99.6 psig, may carry most cargoes that are permitted on a Type IIG ship. Exceptions are cargoes with very low transport temperatures, such as methane and ethane.

Controlling Authority:	G-MOC	Releasing Authority:	G-M	Revision Date:	Unsigned Draft	Page	F1 - 14
------------------------	-------	----------------------	-----	----------------	----------------	------	----------------

SECTION F: CARRIAGE OF HAZARDOUS MATERIALS

CHAPTER 1: HAZARDOUS MATERIALS SAFETY

Pressurized
Cargoes

Cargoes that must be carried in pressure vessel tanks, or must have inerted or dried atmospheres above the cargo, are identified in Columns D and E of the Table of Minimum Requirements. The vapor detection requirements are similar to those in the Chemical Code, except that flammable gas detectors and toxic vapor detectors for certain cargoes must be permanently installed, automatic monitors. Gauging is the same as under the Chemical Code, except that there is no provision for an open gauge. Special requirements are treated in a manner similar to the Chemical Code. The alkanes and alkenes (methane, propane, ethylene, etc.) have no special requirements because the Gas Code was drafted in anticipation of liquefied natural gas (LNG) and liquefied petroleum gas (LPG) ships. Thus, they are the "normal" cargoes, with special requirements in the Gas Code to accommodate cargoes having different properties.

Chlorine

Chlorine is addressed in the Gas Code. The first amendment to the Code contains detailed requirements for its carriage. Anhydrous hydrogen fluoride may be added in the future. As neither of these cargoes may be carried on self-propelled vessels in U.S. waters, they are not included in 46 CFR 154.

4. Additional
Requirements

Because of the detail of the Gas Code, U.S. regulations correspond much more closely to it than to the Chemical Code. However, four major issues were unresolved during the development of the Gas Code. Since they involved primary safety considerations, 46 CFR 154 exceeds the Code in the following areas:

- a. Specification of higher allowable stress factors for Type B and C independent tanks;
- b. Specification of lower design ambient temperatures for hull steel selection;
- c. Enhanced grades of steel for crack-arresting purposes in the deck stringer, the sheer strake, and the bilge strake; and
- d. Prohibition of cargo venting as a means of cargo temperature and pressure control.

NOTE: This is often misunderstood as a total prohibition of venting. The Code provides for controlling cargo pressure and temperature by venting of cargo. However, the Code prohibits the practice of some early LNG ships of mixing boil-off vapors with air and releasing them into the atmosphere.

SECTION F: CARRIAGE OF HAZARDOUS MATERIALS

CHAPTER 1: HAZARDOUS MATERIALS SAFETY

- 5. Control of Venting** To carry all cargoes except methane, a vessel must have a refrigeration/re-liquefaction system or tanks designed to withstand the cargo's vapor pressure at 45°C. Any methane boil-off is required to be re-liquefied (to date, this has not proven economically feasible) or burned in the main propulsion system. Other means of disposal, such as incineration, are also permitted. Venting under certain controlled operations, such as gas trials, may be allowed. Emergencies may dictate control of cargo temperature and pressure by atmospheric venting.

6. Application

The IMO Gas Code applies only to new vessels.

SECTION F: CARRIAGE OF HAZARDOUS MATERIALS

CHAPTER 1: HAZARDOUS MATERIALS SAFETY

I. IMO GAS CODE FOR EXISTING SHIPS**1. Background**

Several IMO delegations were concerned that existing ships might be barred from some ports if they did not have some type of IMO certificate. Therefore, the IMO developed the Code for Existing Ships Carrying Liquefied Gases in Bulk for those vessels not covered by the "IMO Gas Code." The Gas Code for Existing Ships is similar to the IMO Gas Code, although some requirements are significantly relaxed. For example, requirements for cargo tank design, materials of construction, and piping design and construction are much less stringent under the Code For Existing Gas Ships, and damage stability evaluation is not required. Basically, this Code embraces previous standards for gas ship construction without requiring major upgrading. It does not distinguish cargo and hull types, and subject vessels may carry the products listed in Chapter 19 of the Code. These products correspond to the Type II and III cargoes listed in Chapter 19 of the Gas Code for New Ships.

NOTE: Type I cargoes are intentionally excluded from the Gas Code for Existing Ships. Only ships designed and constructed to the IMO Gas Code will be considered for the carriage of such cargoes, including ethylene oxide, methyl bromide, and sulfur dioxide.

2. Requirements

The Gas Code for Existing Ships does require some upgrading of existing ships, particularly for instrumentation and fire protection. This upgrading must have been completed by 31 October 1982. Because the Code generally sets a lower standard for gas ships than does the LOC Program, the Coast Guard will not fully adopt it. The note in the preamble that the Code "is not meant to replace any controls which may already be in operation" refers to the LOC Program. Where the Code requires upgrading to a standard that exceeds current U.S. regulations, the Coast Guard will adopt those provisions in 46 CFR 154.

Controlling Authority:	G-MOC	Releasing Authority:	G-M	Revision Date:	Unsigned Draft	Page	F1 - 17
------------------------	-------	----------------------	-----	----------------	----------------	------	----------------

CHAPTER 1: HAZARDOUS MATERIALS SAFETY

J. SHIPS NOT STRICTLY COVERED BY THE IMO GAS CODES

The Gas Code for Existing Ships was primarily aimed at ships already in service. Although the provisions of the IMO Gas Code and the Gas Code for Existing Ships theoretically apply to all gas ships, there is really a third category of vessels: those under construction when the IMO Gas Code was adopted, but to which it does not apply. It was IMO's intent, as stated in Resolution A.329(IX), that ships under construction should meet the IMO Gas Code as fully as possible, according to their stage of construction. Such ships would, of course, have to meet the requirements of the Gas Code for Existing Ships as a minimum.

SECTION F: CARRIAGE OF HAZARDOUS MATERIALS

CHAPTER 1: HAZARDOUS MATERIALS SAFETY

K. IMDG CODE

-
- 1. Introduction** The IMDG Code was developed by IMO to aid administrations in applying the requirements of Chapter VII of the 1960 and 1974 SOLAS Conventions. The Code contains recommendations for classification, marking, labeling, packaging, placarding, stowage, and segregation of hazardous materials for maritime transportation. It contains information similar to that found in the DOT Hazardous Materials Regulations (49 CFR, Subchapter C).
-

- 2. Application** When packaged hazardous materials are shipped intermodally to the port area (i.e., by truck or rail to the vessel), the shipper may use the Optional Hazardous Materials Table in 49 CFR 172.102. This table incorporates many of the IMDG Code's provisions. This is important to the shipper because it facilitates acceptance of the packages at the port of destination.

NOTE: As indicated in 49 CFR 176.11, parts of the IMDG Code may be used in lieu of 49 CFR, Subchapter C for domestic and international maritime shipment of packaged hazardous materials, except Class A and B explosives and radioactive materials.

Cargo must always be segregated and stowed in accordance with 49 CFR, Subchapter C. However, IMO stowage and segregation requirements have been incorporated to the greatest extent possible in Column 7(c), "Other Requirements," of 49 CFR Table 172.102.

- 3. Alternate Arrangements** Problems may be encountered in trying to comply with the stowage requirements of 49 CFR, Subchapter C. These problems can be resolved by the Captain of the Port (COTP) in accepting alternate stowage procedures under 49 CFR 176.65.
-

SECTION F: CARRIAGE OF HAZARDOUS MATERIALS

CHAPTER 1: HAZARDOUS MATERIALS SAFETY

4. **Format of the Code** The IMDG Code is a five volume, loose-leaf publication. Its introduction serves the following functions:

- a. Explains its purpose and application;
- b. Identifies nine classes of dangerous goods; and
- c. Gives general requirements for testing, shipping documents, classification, marking, labeling, packaging, freight container transport, portable tanks, stowage, and segregation.

NOTE: Each class of dangerous goods is listed separately. The introduction for each class gives specific requirements that are particular to that class. Each commodity or group of commodities is listed on a separate page, which provides a limited description of the product and its properties, its chemical formula where appropriate, the United Nations (UN) classification number, and synonyms. Annex I of the IMDG Code, found in Volume I, contains recommendations with respect to hazardous materials packaging. Annex I uses a performance-test approach rather than detailed packaging specifications, as is used by DOT. IMO packaging falls into three groups, with Group I packaging subject to the most stringent performance tests and Group III the least. Practically speaking, all hazardous materials must be packaged as required by 49 CFR, Subchapter C, unless they are intended to remain within the port area.

5. **Certificates of Competent Authority** Often, the entry on the IMDG Code page for packaging is "Receptacles approved by the competent authority of the country concerned." Other areas of the IMDG Code require specific approval by the "competent authority." In these cases, the OHMT will issue the proper certificate. It is stressed that these are not "exemptions" since they are made in accordance with U.S. law. Shippers desiring competent authority certificates should contact the OHMT at 202-366-4511.

NOTE: Competent authority certificates issued by the OHMT are intended primarily for use in foreign ports. Those issued by foreign governments are valid in the U.S. only in the port area, when the IMDG Code authorizes the use of a competent authority certificate.

Controlling Authority:	G-MOC	Releasing Authority:	G-M	Revision Date:	Unsigned Draft	Page	F1 - 20
------------------------	-------	----------------------	-----	----------------	----------------	------	----------------

CHAPTER 1: HAZARDOUS MATERIALS SAFETY

L. "RECOMMENDATIONS ON THE SAFE USE OF PESTICIDES IN SHIPS"

This publication, IMO Maritime Safety Committee Circular 298, provides useful information on the safe use of pesticides and rodenticides aboard ships. It is of interest because of the possible health and safety hazards of fumigation to persons aboard. Coast Guard regulations for fumigation are contained in 46 CFR 147A (Interim Regulations for Shipboard Fumigation).

SECTION F: CARRIAGE OF HAZARDOUS MATERIALS

CHAPTER 1: HAZARDOUS MATERIALS SAFETY

M. INTERNATIONAL CONVENTION FOR THE PREVENTION OF POLLUTION FROM SHIPS, 1973, AS MODIFIED BY THE PROTOCOL OF 1978, RELATIVE THERETO (MARPOL 73/78).

1. Authority

MARPOL 73/78 is binding under international law and is implemented domestically in 33 U.S.C. 1901-1911.

2. Annex II

Annex II of the MARPOL 73/78 Convention applies to "noxious liquid substances" carried aboard tankers. The criteria for designating "noxious liquid substances" are similar to the Environmental Protection Agency's (EPA's) criteria for identifying "hazardous substances." The Annex is mandatory; any country ratifying the basic Convention must also accept Annex II (the U.S. has ratified the Convention). MARPOL 73/78 entered into force on 2 October 1983; however, Annex II did not become effective until 6 April 1987. The primary intent of the Annex is to limit and control the discharge of hazardous substances into the sea during normal operations, such as tank cleanings, and accidental pollution resulting from groundings and collisions. The IMO has developed equipment and operational standards for ensuring compliance with Annex II. These standards have been implemented in Titles 33 and 46 CFR. The Final Rulemaking was published in the Federal Register on 12 March 1987.

3. Implementation of Annex II

This requires reception facilities to be provided for certain tank cleaning wastes.

NOTE: See NVICs 4-87 and 5-87, MSM Vol. II, Section E, Chapter 1, COMDTINSTs M16450.28 and .29 for guidance on implementing the regulations involving MARPOL Annex II.

4. Annex III

Annex III to MARPOL 73/78 applies to harmful substances carried in packaged form. The U.S. has not yet ratified it.